

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



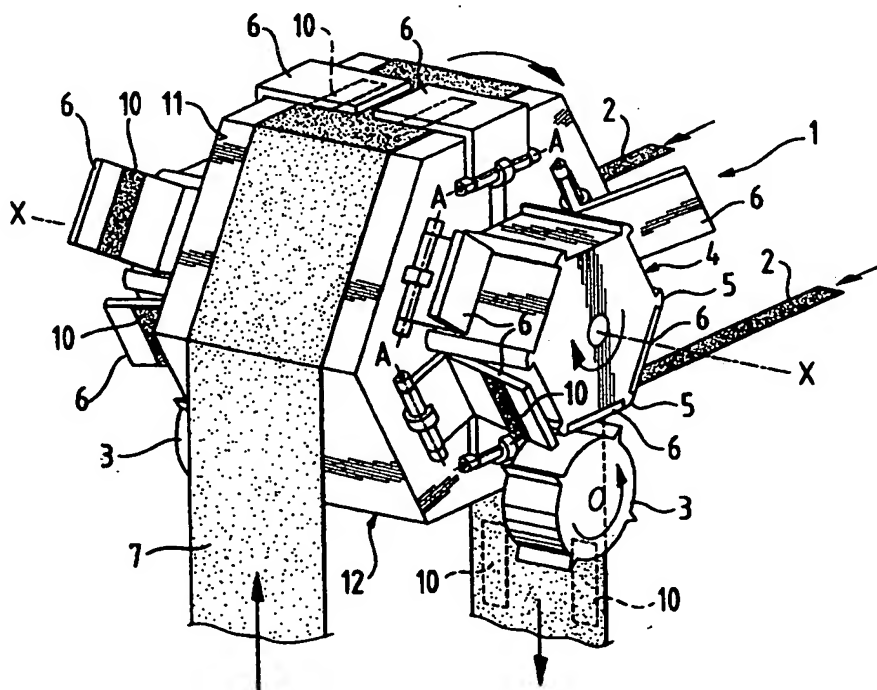
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : A61F 13/15		A1	(11) International Publication Number: WO 00/41664
			(43) International Publication Date: 20 July 2000 (20.07.00)
(21) International Application Number: PCT/US00/00779		(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 12 January 2000 (12.01.00)			
(30) Priority Data: 99100768.3 16 January 1999 (16.01.99) EP			
(71) Applicant (for all designated States except US): THE PROCTER & GAMBLE COMPANY [US/US]; The Procter & Gamble Plaza, Cincinnati, OH 45202 (US).			
(72) Inventors; and (75) Inventors/Applicants (for US only): SCHMITZ, Christoph, Johann [DE/DE]; Dr.-Lieser-Strasse 2, D-53881 Euskirchen-Stotzheim (DE). SCHNEIDER, Uwe [DE/DE]; Regerstrasse 18, D-53359 Rheinbach (DE).			
(74) Agents: REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217-1087 (US).		Published With international search report.	

(54) Title: APPARATUS AND PROCESS FOR APPLYING DISCRETE PORTIONS OF A WEB MATERIAL ONTO A RECEIVING WEB

(57) Abstract

The present invention relates to an apparatus for applying discrete portions (10) of a web material onto a receiving web (7) comprising: a primary axis of rotation and an attachment zone to an average radial distance, R_1 , from the primary axis of rotation; transfer elements (6) rotatable about the axis, the transfer elements receiving a second web (2) at a radial distance, R_2 , from the primary axis wherein the radial distance R_1 , is greater than the radial distance R_2 ; a means for displacing the transfer elements (6) so that the second web (2) is moved immediately adjacent to the attachment zone; and an attachment surface (10) rotatable about the primary axis and through the attachment zone, for transporting the receiving web (7) about the primary axis, whereby discrete portions (10) of the second web (2) are attached to the receiving web (7) in the attachment zone, forming a composite web comprising the receiving web (7) and discrete portions (10) of the second web (2). The present invention also relates to a process for applying discrete portions (10) of a web material onto a receiving web (7) using the above described apparatus.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav	TM	Turkmenistan
BF	Burkina Faso	GR	Greece		Republic of Macedonia	TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

**APPARATUS AND PROCESS FOR APPLYING DISCRETE PORTIONS OF
A WEB MATERIAL ONTO A RECEIVING WEB**

The present invention relates to an apparatus and a process for applying discrete portions of a web material onto a receiving web. The apparatus and process are particularly useful in the manufacture of disposable absorbent articles, including diapers, adult incontinence products, sanitary napkins and the like.

Manufacturing processes are often required to provide discrete strips of a material onto a continuous web, in such a way that the discrete webs of material are spaced apart along the length of the continuous web. Features manufactured in this way include either elastic or non-elastic strips: one example of an elastic strip is the elastic leg cuffs applied to diapers; one example of a non-elastic strip is the absorbent core of a diaper or sanitary napkin which is typically constructed from air-laid fibres.

It is known to provide an apparatus for applying discrete portions of a web material onto a receiving web by supplying elastic strips to transfer members in a supply zone, the transfer members being rotated about a central axis. The transfer members are moved radially outwardly and then, in a transfer zone, the elastic strips are applied to the receiving web so that the elastic strips are transferred from the transfer members and onto the receiving web.

US-A-4 578 133, issued 25th March 1986, discloses a method and apparatus for applying elastic strips to a moving web of material by means of transfer members which move at a first orbital radius through the supply zone and at a second orbital radius through the transfer zone. Optionally the transfer members may also be radially pivoted by pivoting the transfer member about an axis transverse to its strip carrying surface.

However, when the apparatus of the prior art are operated at high speed the contact between the transfer elements, the elastic strips and the receiving web occurs over a very brief period of time, usually no more than several milliseconds. This results in difficulties in achieve good reliable transfer of the strips from the transfer elements on to the receiving web.

It is an objective of the present invention to provide an apparatus wherein the contact time between the transfer elements, the elastic strips and the receiving web is increased.

Summary of the Invention

The invention provides an apparatus for applying discrete portions of a web material onto a receiving web, comprising:

- a primary axis of rotation and an attachment zone at an average radial distance, R_1 , from the primary axis of rotation;
- transfer elements rotatable about the primary axis, the transfer elements receiving a second web at a radial distance, R_2 , from the primary axis wherein the radial distance R_1 is greater than the radial distance R_2 ;
- a means for displacing the transfer elements so that the second web is moved immediately adjacent to the attachment zone; and

- an attachment surface rotatable about the primary axis and through the attachment zone, for transporting the receiving web about the primary axis, whereby discrete portions of the second web is attached to the receiving web in the attachment zone, forming a composite web comprising the receiving web and discrete portions of the second web.

The invention further provides a process for applying discrete portions of a web material onto a receiving web, comprising the steps of:

- providing an attachment zone at an average radial distance, R_1 , from a primary axis of rotation;
- providing a second web at a distance, R_2 , from the primary axis, whereby the radial distance R_1 is greater than the radial distance R_2 ;
- displacing the second web at least in a radial direction relative to the primary axis so that the second web is displaced immediately adjacent to the attachment zone;
- juxtaposing the receiving web and the second web in the attachment zone to form a composite web comprising the receiving web and discrete portions of the second web; and
- transporting the receiving web about an arc of a circle, the circle having a primary axis and a first radius R_1 .

Brief Description of the Drawings

Figure 1 shows a perspective view of an apparatus according to the present invention in which the secondary web is translated through 180° about a secondary axis.

Figure 2 shows a schematic plan view of the apparatus of Figure 1.

Figure 3 shows a schematic side view of a mechanism in cross-section which is suitable for the apparatus embodied in Figure 1.

5 Figure 4 shows a perspective view of an apparatus according to another embodiment of the present invention in which the secondary web is translated through 90° about the secondary axis.

10 Figure 5 shows a perspective view of an apparatus according to still another embodiment of the present invention.

Detailed Description of the Invention

15 It will be readily apparent to those skilled in the art that although the following description of the present invention is in connection with a single use diaper structure having discrete elastic regions or strips, the present invention may be practiced with equal facility on nearly any web.

20 It is preferred that the receiving web is a continuous web throughout the process of the present invention. In the following description a "continuous web" is a web of material which is continuous in the machine direction. A preferred continuous web comprises a plurality of interconnected single use disposable absorbent articles, such as diapers. Typically, each diaper is comprised of an absorbent pad element or absorbent core, and elastomeric elements or patches.

25 The absorbent pad elements and the elastomeric elements are located between a backsheet and a topsheet, or alternatively, on top of a backsheet or topsheet. The continuous webs of backsheet material and topsheet material are preferably maintained under very slight tension in the machine direction to prevent wrinkling and to facilitate registration with the diaper assembly and converting operations

30 until the completed diaper web is severed into discrete diapers by cutting across the width of the web. An alternative single use disposable absorbent article is a sanitary napkin or feminine hygiene pad.

The apparatus and process of the present invention provide a means for attaching discrete portions of one web onto a continuous receiving web. The discrete portions are intermittently spaced upon the receiving web by the apparatus and process of the present invention. The apparatus and process of the present invention provide "area contact" instead of "line contact" to the receiving web to transfer the discrete portions of another web material. This gives much longer process times to secure the discrete portions onto the receiving web. Moreover, it avoids extrusion effects either of the discrete portions or of the receiving web, which is important if they are soft and/or thick.

Another advantage of the apparatus of the present invention is in the fact that the discrete portions of web material and the receiving web are bent or shaped the same way when they are combined. This has advantages for several products, e.g. the combining step of feminine hygiene pads should be done such that the products are directly manufactured to the required body shape.

Preferably, the apparatus comprise a means for displacing the second web which comprises a plurality of segments, each segment being rotatable about a secondary axis wherein the secondary axis is orthogonal to the primary axis and does not intersect with the primary axis.

Even more preferably each rotatable segment receives a discrete portion of the second web, and the segment then rotates about the secondary axis through at least about 90°, and most preferably through about 180°, and juxtaposes the discrete portion of the second web against the receiving web in the attachment zone.

Figures 1 to 3 illustrate a preferred embodiment of the present invention.

Figures 1 and 2 show an apparatus 1 and show a pair of webs 2 being fed into the apparatus. Each web 2 is fed towards an anvil drum 4 which, in this

particular embodiment of the apparatus, is a hexagonal drum. The anvil drum comprises a plurality of anvils 5 (in this particular embodiment the hexagonal anvil drum 4 comprises six anvils 5). At the point of transfer of the incoming web 2 to the anvil drum 4, a transfer element 6 is interposed between the incoming web 2 and the anvil drum 4, and the incoming web is attached to the transfer element 6 and cut into discrete portions 10 by a knife roll 3 acting against the anvil 5. As the anvil drum 4 is rotated about the primary axis of the apparatus, the transfer elements 6 are displaced by additionally rotating the transfer elements about a secondary axis, A-A. After a rotation of the transfer element 6 through 180° (which corresponds in the illustrated embodiment of Figure 1 to a rotation of the anvil 4 about the primary axis of about 140°), the transfer element 6 is juxtaposed with a receiving web 7 in an attachment zone. The receiving web 7 is continuously fed onto the outer surface 11 of a hexagonal attachment drum 12. In the attachment zone the discrete portions 10 of the web 2 are transferred to, and attached to, the receiving web assisted by pressure applied between the transfer element 6 and the surface 10 attachment drum 12. As the apparatus 1 continues to rotate about the primary axis, the transfer element 6 rotates about the secondary axis in the opposite direction to the previous part of the cycle, so that after a rotation of 180° the transfer element 6 has returned to its original position and is interposed between the anvil 4 and the incoming web 2. The cycle is now ready to repeat.

Figures 1 and 2 illustrate a hexagonal anvil drum 4, a hexagonal attachment drum 12, and six pairs of transfer elements 6. Of course the apparatus could equally well consist of an octagonal anvil drum, and octagonal attachment drum, and eight pairs of transfer elements; or any other desired number of transfer elements. Furthermore, whilst Figure 1 shows pairs of transfer elements 6 disposed on either side of the apparatus 1, the apparatus 1 may only be fitted with one set of transfer elements 6 on one side of the apparatus 1.

Figure 3 shows a cross section of an apparatus 1 according to the present invention. The attachment drum 12 rotates about the primary axis of the

apparatus 1. A cam 31 is mounted within the attachment drum 12 to guide an oscillating mechanism 32 which is provided with a rack 33. The rack cooperates with a pinion 34 which is linked to the pivotally mounted transfer element 6. When the oscillating mechanism 32 is in the position indicated in the lower part of Figure 3, the transfer elements 6 are in position ready to receive the incoming web 2 at an average radial distance R_2 from the principal axis. Knife rolls 3 cut the web 2 into discrete portions. As the apparatus 1 rotates about the principal axis, the oscillating mechanism 32 is pushed inwards, towards from the principal axis, by means of resilient members, such as springs 35. The rack and pinion 33, 34 cause the transfer elements 6 to rotate about a secondary axis. When the oscillating mechanism 32 is in the position indicated in the upper part of Figure 3, the transfer elements 6 have moved through 180° about the secondary axis into the attachment zone and the discrete portions of the web are transferred to the receiving web on the outer surface 11 of the attachment drum 12 at an average radial distance R_1 from the principal axis.

Figures 4 and 5 illustrate alternative embodiments of the present invention.

Figure 4 shows an apparatus 41 according to an alternative embodiment of the present invention. Figure 4 shows a pair of webs 42 being fed into the apparatus. Each web 42 is fed towards an anvil 44 which, in this particular embodiment of the apparatus, is a ten-sided drum. At the point of transfer of the incoming web 42 to the anvil 44, a transfer element 46 is interposed between the incoming web 42 and the anvil 44, and the incoming web is attached to the transfer element 46 and cut into discrete portions by a knife roll 43 acting against the anvil 45. As the anvil drum 44 is rotated about the primary axis, the transfer elements 46 are displaced by additionally rotating the transfer elements about a secondary axis. After a rotation of the transfer element 46 through 90° (which corresponds in the illustrated embodiment of Figure 4 to a rotation of the anvil 44 about the primary axis of about 140°), the transfer element 46 is juxtaposed with a receiving web 47 in an attachment zone. The receiving web 47 is continuously fed onto the flange of an attachment drum 49. In order to accommodate the

linear receiving web 47 around the circular path of the flange 49 of the attachment drum, a series of "hold-down" sections and compensation triangles are provided as illustrated in Figure 4. In the attachment zone the discrete portions of the web 42 are transferred to, and attached to, the "hold-down" section of the receiving web 47 assisted by pressure applied between the transfer element 46 and the flange 49 of the attachment drum. As the apparatus 41 continues to rotate about the primary axis, the transfer element 46 rotates about the secondary axis in the opposite direction to the previous part of the cycle, so that after a rotation of 90° about the secondary axis the transfer element 46 has returned to its original position and is interposed between the anvil 44 and the incoming web 42. The cycle is now ready to repeat.

Figure 5 shows an apparatus 51 according to another alternative embodiment of the present invention. Figure 5 shows a of web 52 being fed into the apparatus. The web 52 is fed towards an anvil drum 54. At the point of transfer of the incoming web 52 to the anvil 54, a transfer element 56 is interposed between the incoming web 52 and the anvil 54 the incoming web is attached to the transfer element 56 and cut into discrete portions by a knife roll 53 acting against the anvil 55. As the anvil drum 55 is rotated about the primary axis, the transfer elements 56 are displaced both parallel to the primary axis as well as radially away from the primary axis, the displacement being indicated by arrows in Figure 5, into an attachment zone. The attachment zones lie in a series of apertures in the outer surface of the attachment drum 59. The discrete portions of the web 52 are bonded to the receiving web 57 by means of pressure applied by a bonding roll 58 located outside of the path of the receiving web 57, acting upon the displaced transfer element 6. The transfer elements 56 are subsequently displaced back to their original position so that the cycle can be repeated.

In an optional aspect of the invention, glue can be applied either to the knives or to the anvil of any embodiment of the invention, before the second web is cut into discrete portions. When the second web is cut into discrete portions,

glue is transferred to the ends of the discrete portions which provides for efficient sealing of the cut ends of the discrete portions with a very small amount of glue.

5 WHAT IS CLAIMED IS:

1. An apparatus (1) for applying discrete portions (10) of a web material onto a receiving web (7), comprising:
 - a primary axis of rotation and an attachment zone at an average radial distance, R_1 , from the primary axis of rotation;
 - 10 - transfer elements (6) rotatable about the primary axis, the transfer elements receiving a second web (2) at a radial distance, R_2 , from the primary axis wherein the radial distance R_1 is greater than the radial distance R_2 ;
 - a means for displacing the transfer elements (6) so that the second web
15 (2) is moved immediately adjacent to the attachment zone;
characterised in that the apparatus further comprises
 - an attachment surface (10) rotatable about the primary axis and through the attachment zone, for transporting the receiving web (7) about the primary axis, whereby discrete portions (10) of the second web (2) are
20 attached to the receiving web (7) in the attachment zone, forming a composite web comprising the receiving web (7) and discrete portions (10) of the second web (2).
2. An apparatus according to claim 1 wherein the means for displacing the
25 second web (2) comprises a plurality of segments, each segment being rotatable about a secondary axis wherein the secondary axis is orthogonal to the primary axis and does not intersect with the primary axis.
3. An apparatus according to claim 2 wherein each rotatable segment receives
30 a discrete portion (10) of the second web (2), and wherein in segment rotates about the secondary axis through at least about 90° , and preferably

through about 180°, and juxtaposes the discrete portion (10) of the second web (2) against the receiving web (7) in the attachment zone.

4. An apparatus according to any of the previous claim further comprising a means (3, 5) for cutting the second web (2) into the discrete portions (10).

5. A process for applying discrete portions (10) of a web material onto a receiving web (7), comprising the steps of:

- providing an attachment zone at an average radial distance, R_1 , from a primary axis of rotation;
- providing a second web (2) at a distance, R_2 , from the primary axis, whereby the radial distance R_1 is greater than the radial distance R_2 ;
- displacing the second web (2) at least in a radial direction relative to the primary axis so that the second web (2) is displaced immediately adjacent to the attachment zone;
- juxtaposing the receiving web (7) and the second web (2) in the attachment zone to form a composite web comprising the receiving web (7) and discrete portions (10) of the second web (2);

characterised in that the process further comprises the step of

- transporting the receiving web about a path lying essentially in the arc of a circle, the essentially circular path at radius R_1 from the primary axis of rotation.

6. A process according to claim 5 wherein the discrete portions (10) of the second web (2) are displaced in an axial direction, in addition to the translation in the radial direction, relative to the primary axis.

7. A process according to claim 6 wherein the discrete portions (10) of the second web (2) are displaced about a secondary axis, wherein the secondary axis is orthogonal to the primary axis and does not intersect with the primary axis.
- 5 8. A process according to claim 7 wherein the discrete portions (10) of the second web (2) are translated through at least about 90° about the secondary axis, and preferably the discrete portions (10) of the second web are translated through about 180° about the secondary axis.
- 10 9. A process according to any of claims 5 to 8 further comprising the step of cutting the second web (2) into the discrete portions (10), wherein the cutting step preferably takes place at a distance R_2 from the primary axis.
- 15 10. A process according to claim 9 wherein the cutting step is carried out by means of the action of a knife upon an anvil, and wherein the surface of either or both of the knife and anvil have glue applied to them before the cutting step.



2/4

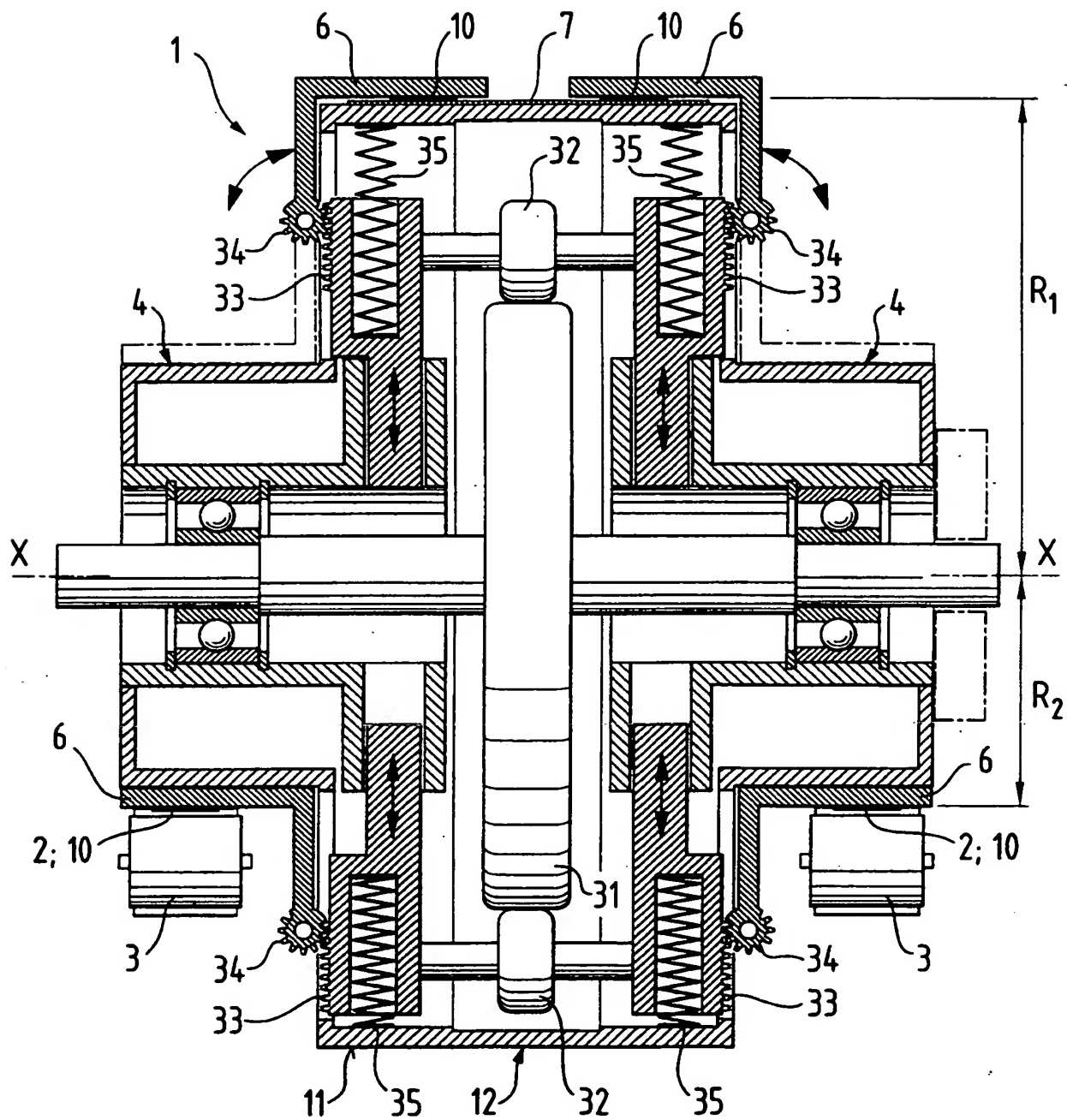
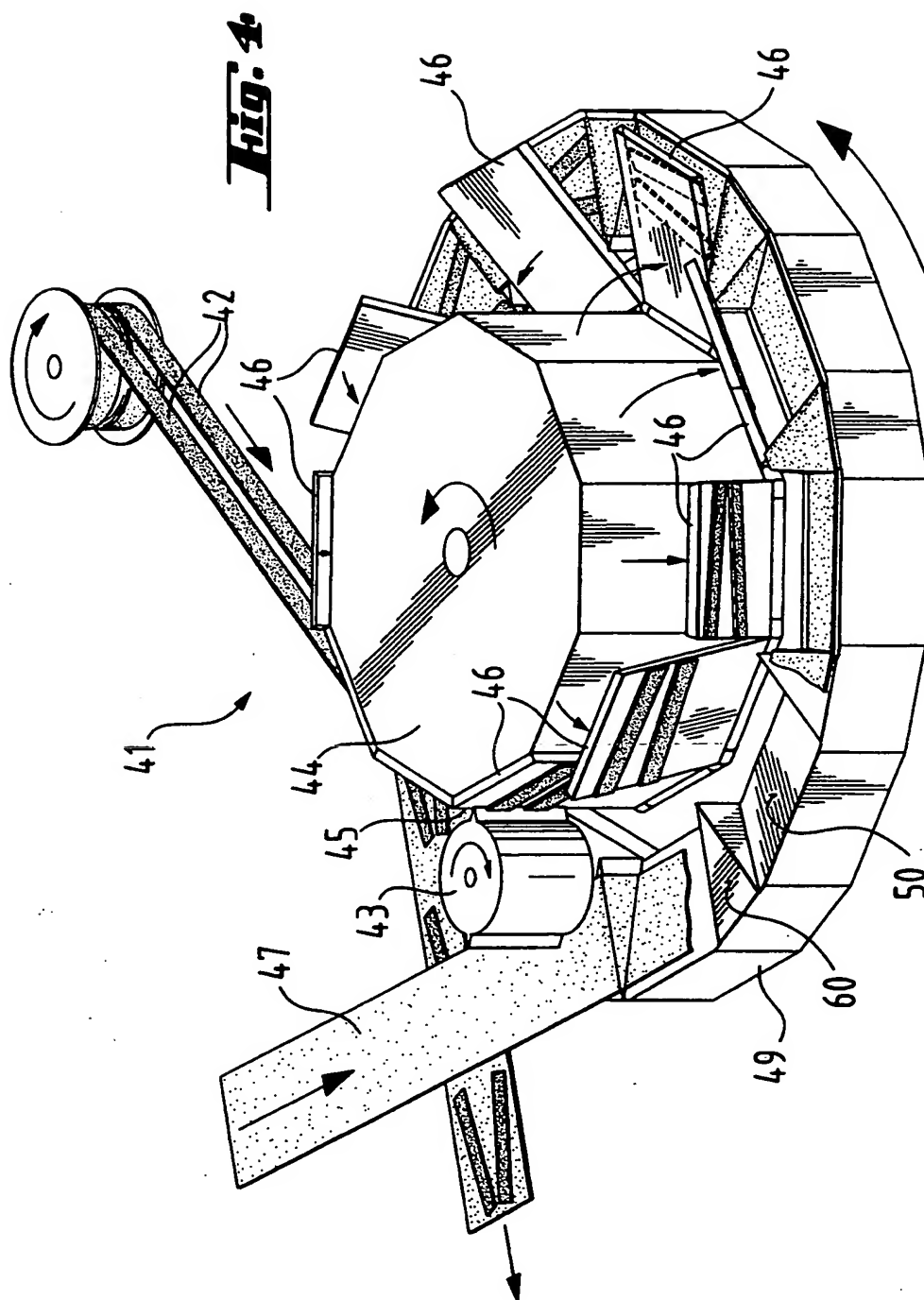
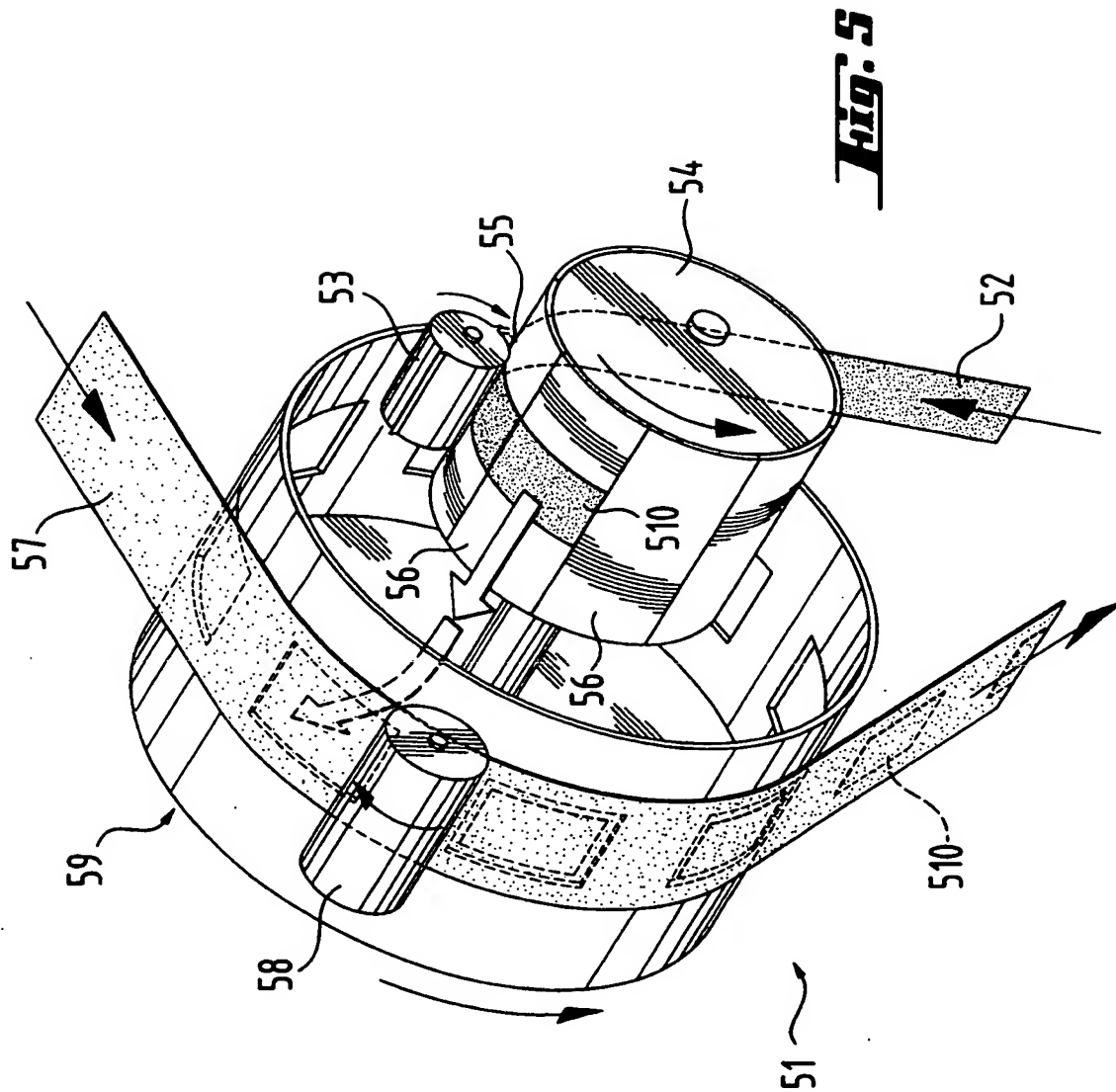


Fig. 3

3/4





INTERNATIONAL SEARCH REPORT

Inter. Appl. Application No.

PCT/US 00/00779

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61F13/15

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61F B65H B31B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 578 133 A (OSHEFSKY DANIEL J ET AL) 25 March 1986 (1986-03-25) cited in the application abstract; claims; figure 3B	1-10
A	US 5 660 665 A (JALONEN ALVIN CHARLES) 26 August 1997 (1997-08-26)	
A	US 5 759 340 A (BOOTHE JUDSON LAMAR ET AL) 2 June 1998 (1998-06-02)	
A	WO 96 23470 A (KIMBERLY CLARK CO) 8 August 1996 (1996-08-08)	

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.*** Special categories of cited documents :**

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"A" document member of the same patent family

Date of the actual completion of the international search

23 March 2000

Date of mailing of the international search report

31/03/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3018

Authorized officer

Soederberg, J

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/00779

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4578133 A	25-03-1986	AU 4995885 A	29-05-1986
		BR 8505800 A	12-08-1986
		EP 0184072 A	11-06-1986
		GB 2170482 A	06-08-1986
		JP 61162462 A	23-07-1986
		US 4617082 A	14-10-1986
		ZA 8508723 A	30-07-1986
US 5660665 A	26-08-1997	AU 1079297 A	14-07-1997
		CA 2238445 A	26-06-1997
		WO 9722317 A	26-06-1997
US 5759340 A	02-06-1998	US 5716478 A	10-02-1998
		AU 706863 B	24-06-1999
		AU 7155696 A	07-05-1997
		BR 9611025 A	13-07-1999
		CA 2231510 A	24-04-1997
		CN 1203522 A	30-12-1998
		CZ 9801155 A	12-08-1998
		EP 0869755 A	14-10-1998
		HU 9901444 A	28-09-1999
		JP 11513647 T	24-11-1999
		NZ 319354 A	28-10-1998
		PL 326293 A	14-09-1998
		SK 49998 A	07-10-1998
		WO 9714387 A	24-04-1997
WO 9623470 A	08-08-1996	AU 707395 B	08-07-1999
		AU 4857196 A	21-08-1996
		BR 9607484 A	19-05-1998
		CA 2155137 A	01-08-1996
		CZ 9702400 A	14-01-1998
		EP 0806926 A	19-11-1997
		HU 9802223 A	28-01-1999
		JP 10513077 T	15-12-1998
		PL 321762 A	22-12-1997
		SK 97297 A	08-04-1998
		US 5556504 A	17-09-1996